CLAIMS

What is claimed is:

1. A thermostatic expansion valve, comprising:

a valve body having a metering passage fluidly connecting a condenser outlet port and an evaporator inlet port, and a return passage fluidly connecting an evaporator outlet port and a compressor inlet port, said valve body also including a control passage fluidly-connected to said return passage;

a power element mounted to said valve body, said power element including diaphragm housing portions supporting a diaphragm, one housing portion together with one surface of the diaphragm defining a head chamber for containing a fluid charge, and another housing portion together with another surface of the diaphragm cooperating with the body and defining a diaphragm chamber, the control passage fluidly connecting the diaphragm chamber with the return passage;

a valve in a valve bore extending between the metering and return passages, said valve having a valve element disposed in said metering passage moveable from a first position preventing fluid flow through the metering passage to a second position allowing fluid flow through the metering passage; and

a pressure pad having a thermal conductivity of at least about 800800 BTU-in/hr-ft^2-°F (115 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3), and disposed at least partially in said return passage, said pressure pad including i) a body, ii) an enlarged head at one end of the pressure pad body disposed against the diaphragm and moveable in conjunction therewith, and iii) a pin integral with and extending away from another end of the pressure pad body, and operatively connected to said valve.

2. The valve as in claim 1, wherein the pin, pressure pad body and head of the pressure pad are unitary.

3. The valve as in claim 2, wherein said pressure pad body is a solid cylinder.

4. The valve as in claim 1, wherein one or more of said pressure pad body, pin, and head is formed substantially entirely of a material having a thermal conductivity of at least about 800 BTU-in/hr-ft^2-°F (115 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3).

5. The valve as in claim 4 wherein said material comprises one or more metals, one or more metal alloys, one or more ceramics, carbon, one or more carbon allotropes, one or more polymeric materials, or a combination thereof.

6. The valve as in claim 4 wherein said material comprises copper.

7. The valve as in claim 2, wherein said pressure pad is formed substantially entirely of a material having a thermal conductivity of at least about 800 BTU-in/hr-ft^2-°F (115 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3).

8. The valve as in claim 7 wherein said material comprises one or more metals, one or more metal alloys, one or more ceramics, carbon, one or more carbon allotropes, one or more polymeric materials, or a combination thereof.

9. The valve as in claim 7 wherein said material comprises copper.

10. The valve as in claim 1 wherein said pressure pad has a thermal conductivity of at least about 2000 BTU-in/hr-ft^2-°F (280 W/m-K).

11. The valve as in claim 1 wherein said pressure pad has a thermal conductivity of at least about 1200 BTU-in/hr-ft^2-°F (170 W/m-K).

12. The valve as in claim 1, wherein one or more of said pressure pad body, pin, and head is formed substantially entirely of a material having a thermal conductivity of at least about 2000 BTU-in/hr-ft^2-°F (280 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3).

13. The valve as in claim 1, wherein one or more of said pressure pad body, pin, and head is formed substantially entirely of a material having a thermal conductivity of at least about 1200 BTU-in/hr-ft^2-°F (170 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3).

14. The valve as in claim 2, wherein said pressure pad is formed substantially entirely of a material having a thermal conductivity of at least about 2000 BTU-in/hr-ft^2-°F (280 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3).

15. The valve as in claim 2, wherein said pressure pad is formed substantially entirely of a material having a thermal conductivity of at least about 1200 BTU-in/hr-ft^2-°F (170 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3).

16. A thermostatic expansion valve, comprising:

a valve body having a pair of side surfaces and upper and lower end surfaces, said valve body including a metering passage fluidly connecting a condenser outlet port on one side surface with an evaporator inlet port on the other side surface, and a return passage fluidly connecting an evaporator outlet port on the one side surface with a compressor inlet port on the other side surface, said valve body also including a control passage fluidly connected to said return passage ;

a power element mounted to said one end surface of said housing, said power element including a diaphragm supported by an outer domed head and an inner support cup, said domed head and an outer surface of the diaphragm defining a charge chamber for containing a fluid charge, and said support cup and an inner surface of the diaphragm cooperating with the valve body to enclose the diaphragm chamber, said control passage fluidly connecting the diaphragm chamber with the return passage,

a valve having a valve stem disposed in a valve bore extending between the metering and return passages, said valve including a valve element at one end of the valve stem in said metering passage moveable from a first position preventing fluid flow through the metering passage to a second position allowing fluid flow through the metering passage; and

a unitary pressure pad at another end of the valve stem in thermally-conductive contact with the inner surface of the diaphragm and in thermal contact with fluid flowing

through said return passage, said pressure pad having a thermal conductivity of at least about 800 BTU-in/hr-ft^2-°F (115 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3), and including i) a solid cylindrical body disposed in the diaphragm chamber, ii) an enlarged circular head at one end of the pressure pad body disposed in surface-to-surface contact with the diaphragm, and iii) a cylindrical pin integral with and extending axially away from another end of the pressure pad body, into said return passage and operatively connected to said valve.

17. The valve as in claim 16, wherein said pressure pad is formed substantially entirely of a material having a thermal conductivity of at least about 800 BTU-in/hr-ft^2-°F (115 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3).

18. The valve as in claim 17 wherein said material comprises one or more metals, one or more metal alloys, one or more ceramics, one or more carbon allotropes, one or more polymeric materials, or a combination thereof.

19. The valve as in claim 17 wherein said material comprises copper.

20. The valve as in claim 16 wherein said pressure pad has a thermal conductivity of at least about 2000 BTU-in/hr-ft^2-°F (280 W/m-K).

21. The valve as in claim 16 wherein said pressure pad has a thermal conductivity of at least about 1200 BTU-in/hr-ft^2-°F (170 W/m-K).

22. The valve as in claim 16, wherein said pressure pad is formed substantially entirely of a material having a thermal conductivity of at least about 2000 BTU-in/hr-ft^2-°F (280 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3).

23. The valve as in claim 16, wherein said pressure pad is formed substantially entirely of a material having a thermal conductivity of at least about 1200 BTU-in/hr-ft^2-°F (170 W/m-K), and a density of at least about 0.3 lb/in^3 (8 g/cm^3).